How to Download Point Cloud Data for Large Areas of Interest

What are the MD iMAP Statewide Bulk LiDAR Downloads?

The Maryland State Bulk LiDAR Downloads are a series of grouped LAZ from LiDAR collections in Maryland. LAZ is a lossless compression format of the standard point cloud LAS format; this allows for access to much larger areas of interest with each individual download.

When should I use the MD iMAP Statewide Bulk LiDAR Downloads?

These data were organized for users looking for large areas of point cloud data.

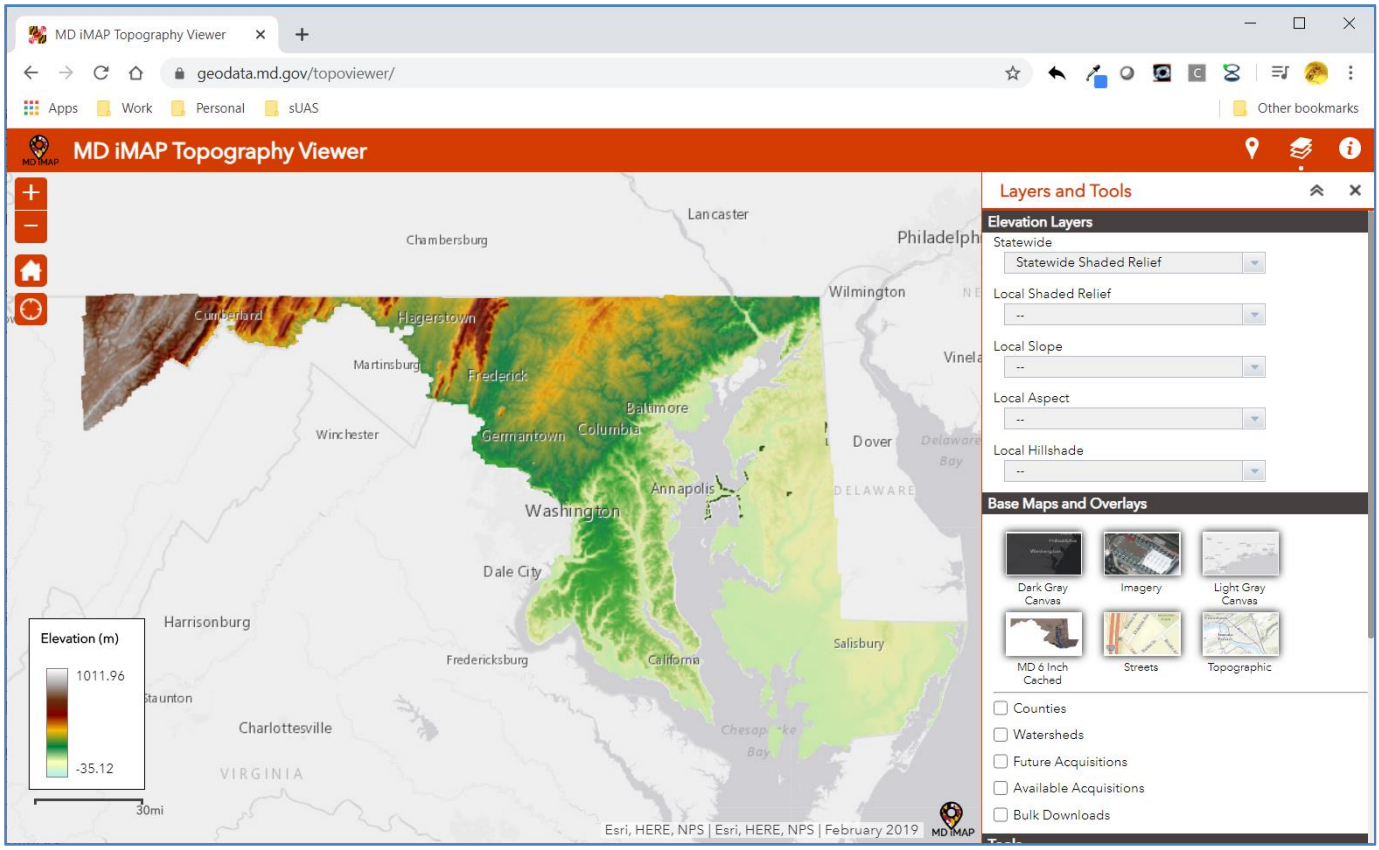
Users looking for surface models, DEMs and derivatives raster datasets should explore the REST Services Directory, and available content on the Pre-Defined DEM Downloads page.

Designed for large areas of interest, the Maryland Statewide Bulk LiDAR Downloads provide compressed LAZ files to users, organized by predefined blocks of data based on their collection date and storage size.

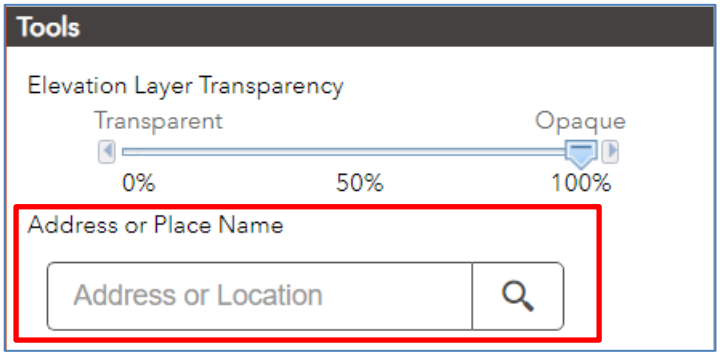
This tutorial will cover how to access, locate and download large areas of point cloud data via Dropbox, using the MD iMAP Topography Viewer and the Maryland LiDAR Topography Server. The tutorial concludes with a guide on LAZ to LAS extraction using Windows Command Prompt with a sample code block for reference.

Access Downloads through the MD iMAP Topography Viewer

1. The MD iMAP Topography Viewer is the recommended method for accessing LiDAR Downloads. Open web browser and navigate to https://geodata.md.gov/topoviewer/

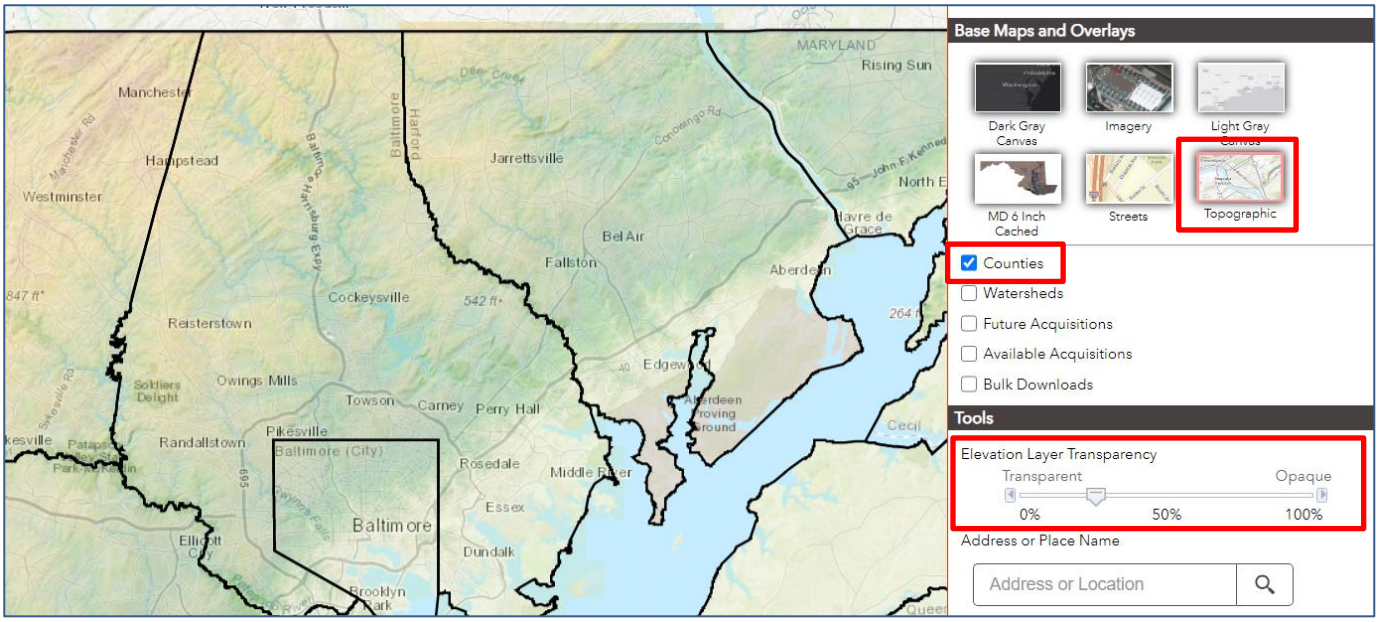


2. Navigate and zoom to your area of interest, or use the embedded address locator under 'Tools' to search for an address or place name:

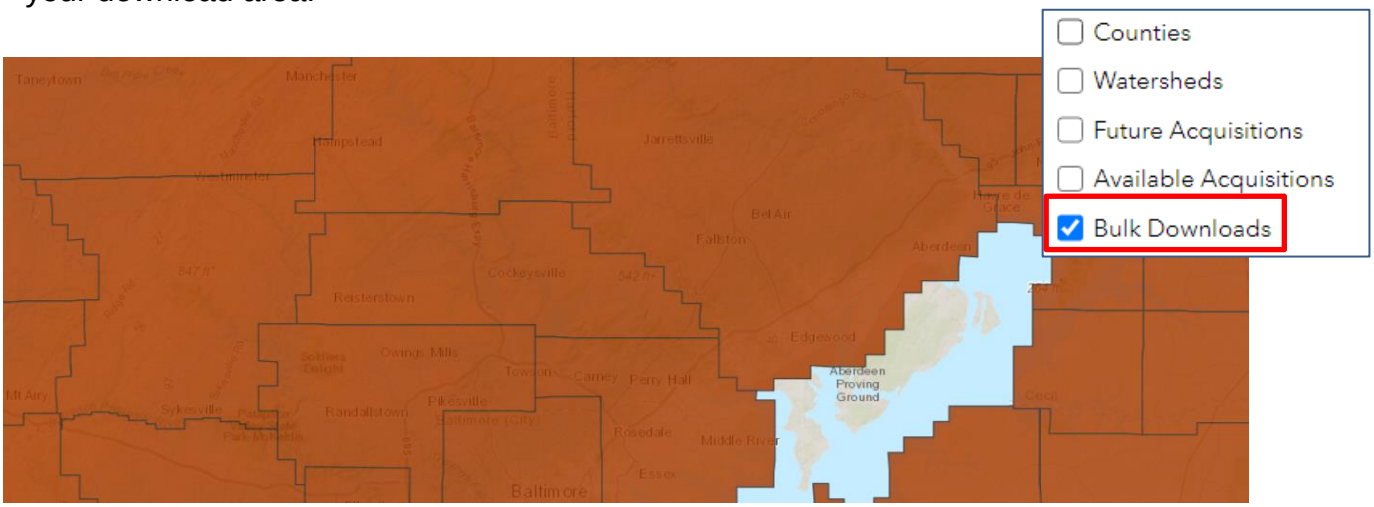


3. Users may wish to use a combination of basemaps, overlays and transparencies to better visualize and determine their particular area of interest.

   The example shown below is a combination of the ‘Topographic’ basemap with ‘Counties’ layer checked on and roughly 25% opacity set on the elevation layer (shaded relief)



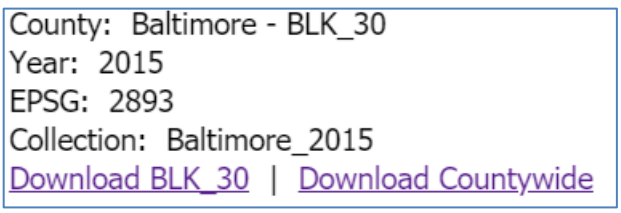
4. Check the box for ‘Bulk Downloads’ under ‘Base Maps and Overlays’ to visualize and select your download area:



5. Single click the download block coverage polygon to open the associated pop-up window:

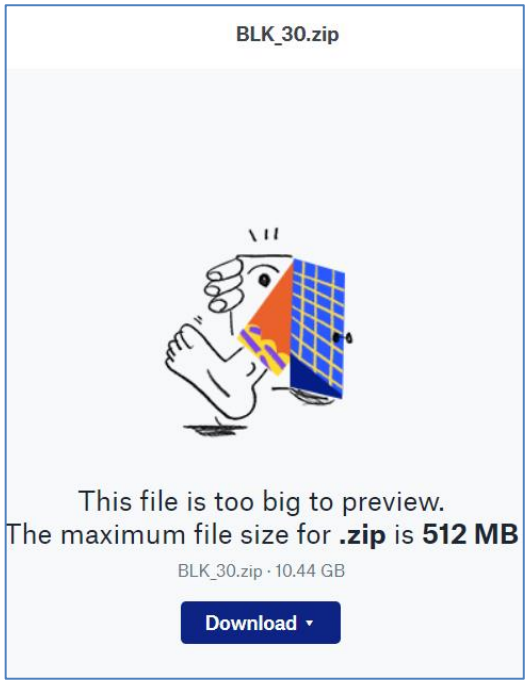
If you see this popup instead, click on the  icon to fully expand the pop-up window

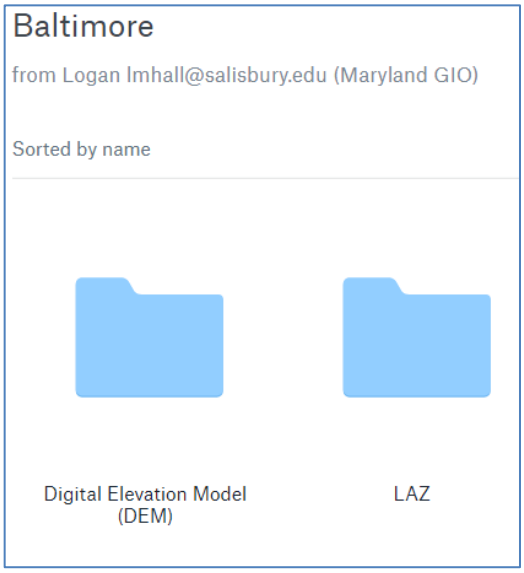
6. Select from the options:



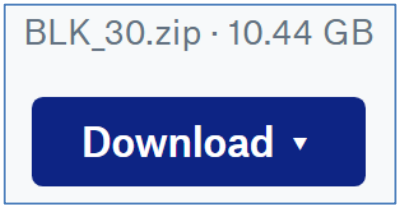
‘***Download BLK_X’*** – takes you directly to the block download page on Dropbox

‘***Download Countywide’*** – takes you to the county-level folder on Dropbox for access to all downloadable products for that county





Make note of the file size before downloading; check your local storage to ensure you have sufficient space for the download



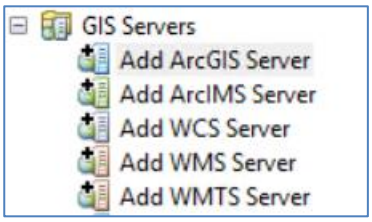
Skip to Section 3: Download data from Dropbox

Or, continue to **Section 4** on the following page for information on accessing the same download links via the Maryland LiDAR Topography Server through ArcGIS for Desktop.

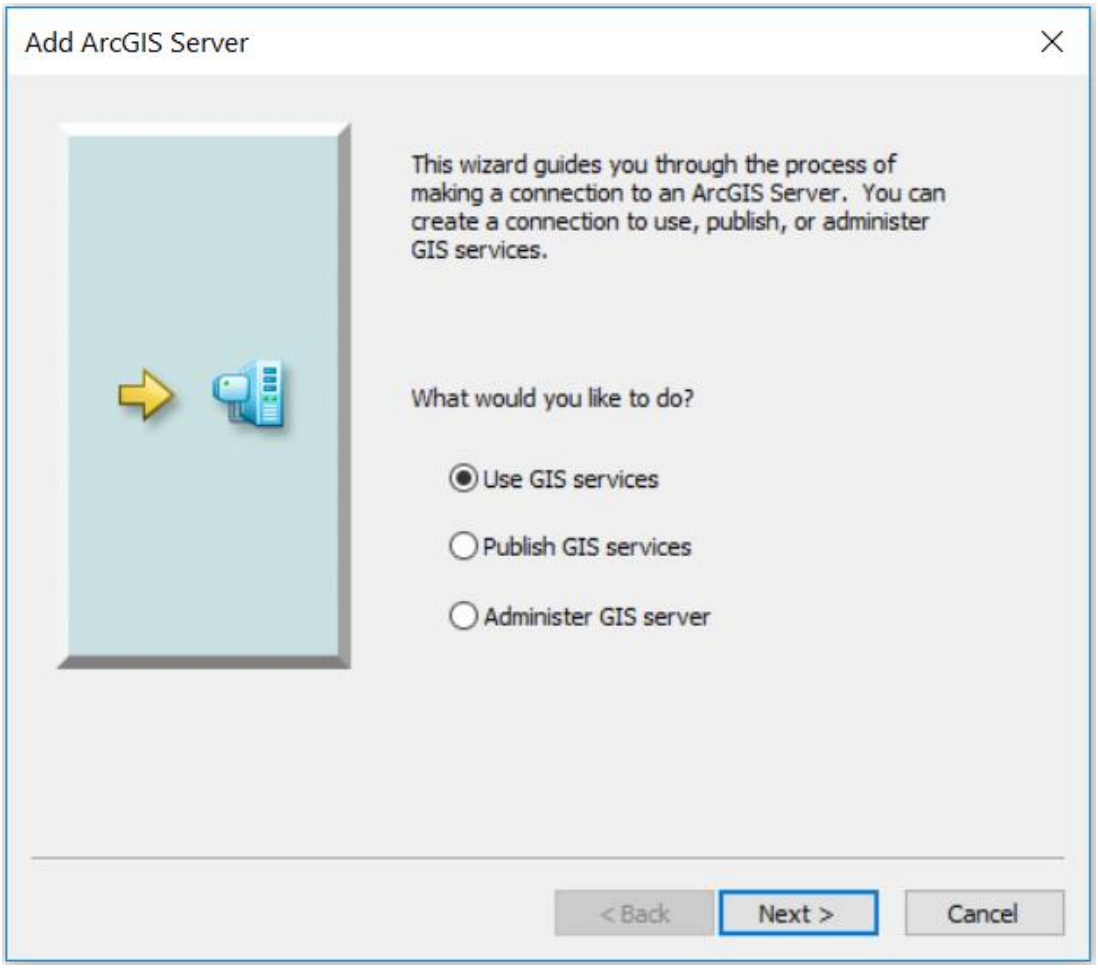
Access Downloads through the Maryland LiDAR Topography Server

7. For users that prefer to access the download block grid via the topography server; open ArcMap and navigate to the catalog window.

Expand ‘GIS Servers’ and double click ‘Add ArcGIS Server’

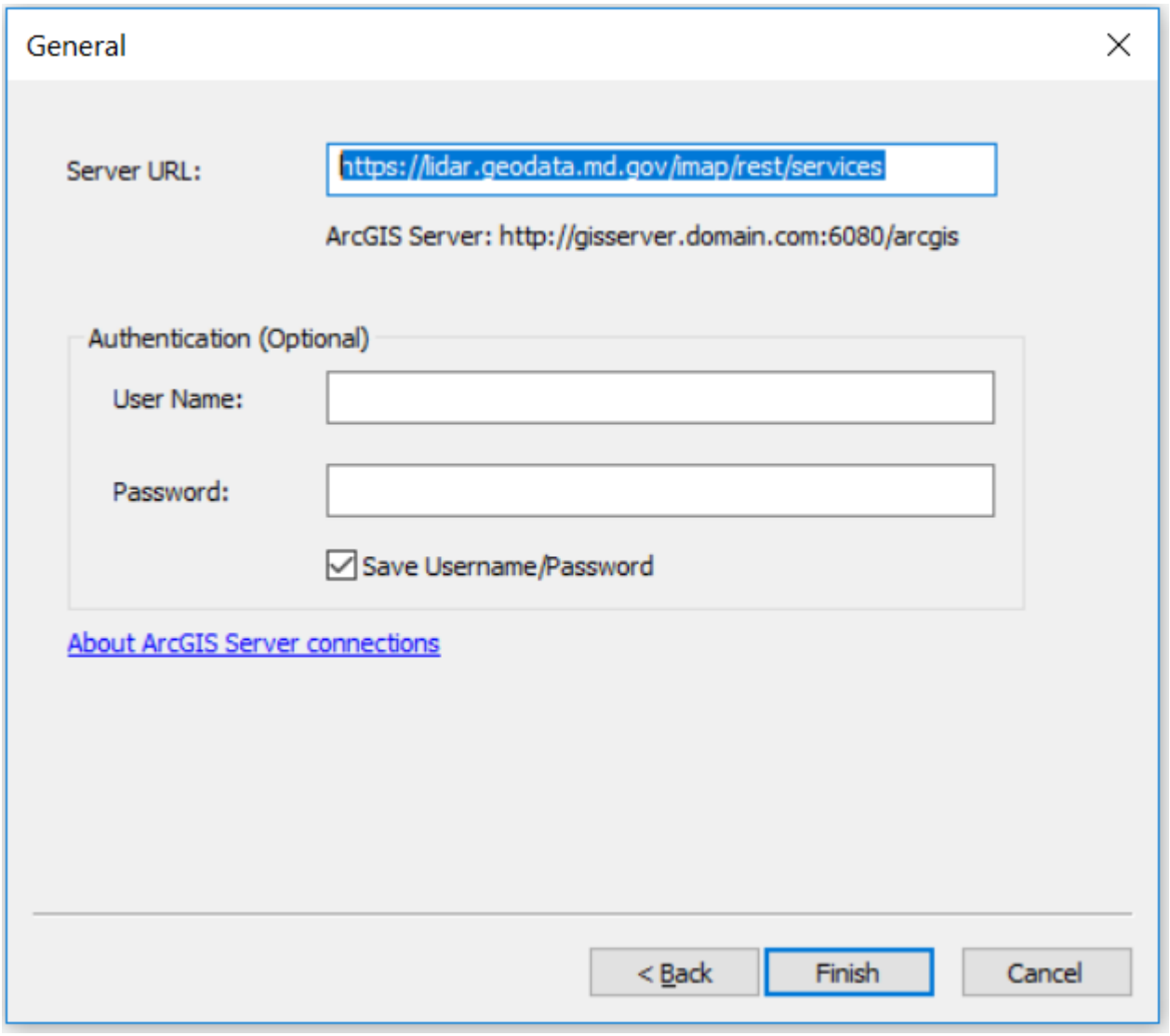


8. Select ‘Use GIS services’ and click Next



9. Enter the Server URL: https://lidar.geodata.md.gov/imap/rest/services

   Username and password are not required – Click Finish to establish the connection



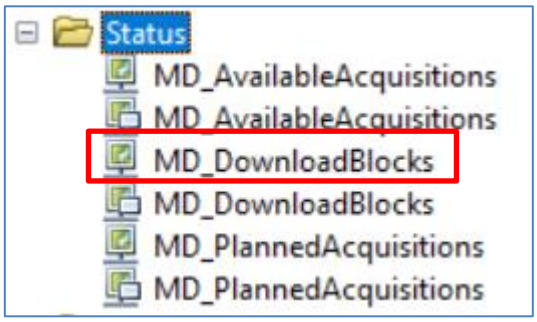
10. Verify the connection in ArcMap – Catalog Window:

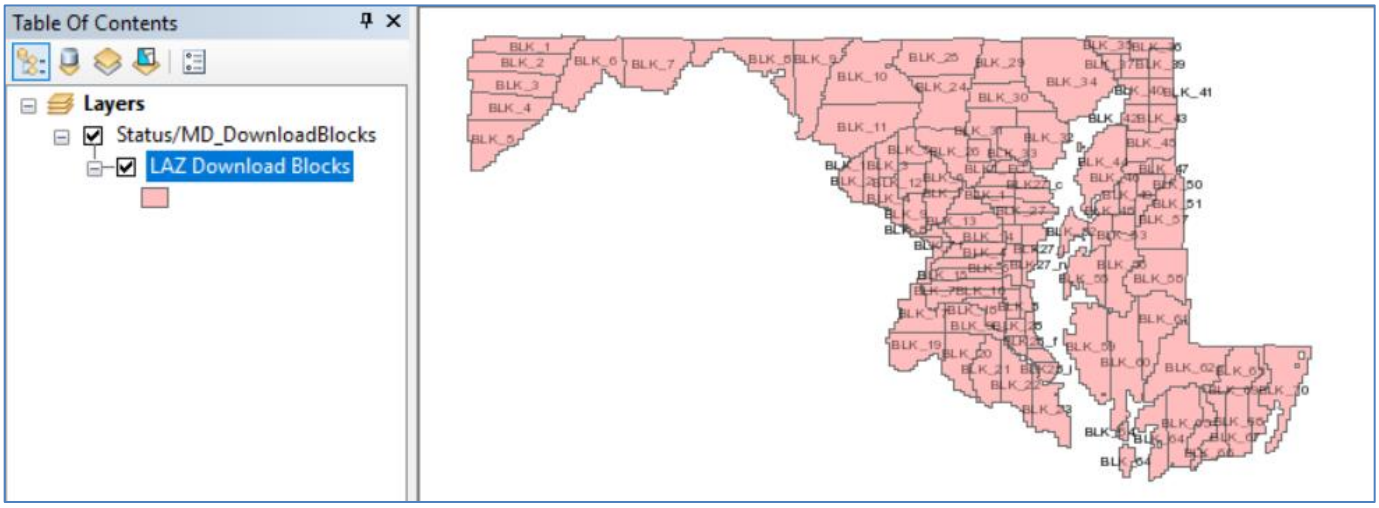
11. Expand the server connection:

    Expand the ‘Status’ folder,

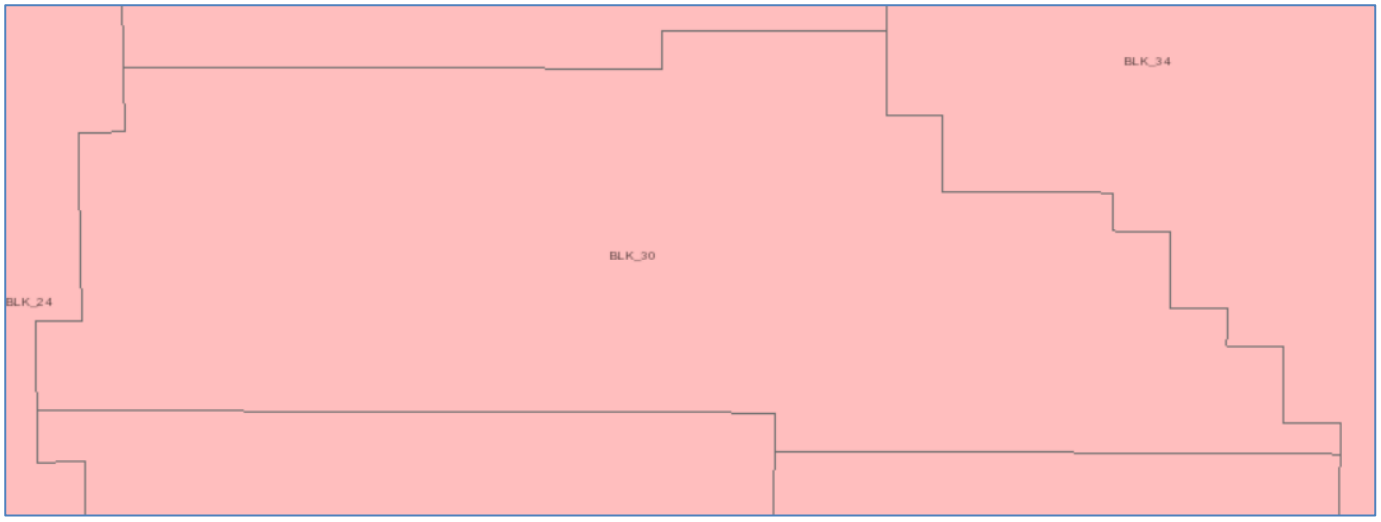
    Select ‘**MD_Download_Blocks’** map service

    Add map service layer to your map:





12. Zoom in to your area of interest on the map:



13. Using the identify  tool

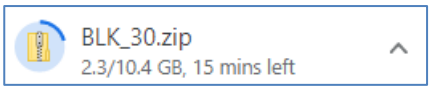
Single click the polygon coverage to return its associated attributes

Field	Value
GIS Object ID	101
Block	BLK_30
County	Baltimore
Collection	Baltimore_2015
EPSG	2893
Year	2015
Block Download Link	https://www.dropbox.com/s/194h2wv1k5nteq9/BLK_30.zip?dl=0
Countywide Download Link	https://www.dropbox.com/sh/p1gkkxyvaalgr57/AAB52qAcFkf5E.
GIS Shape	Polygon

14. Single click either the ‘Block Download Link’ or ‘Countywide Download Link’ to take you to the respective Dropbox download pages for that LiDAR collection.

Download data from Dropbox

15. Ensure your download location has sufficient storage prior to beginning the download

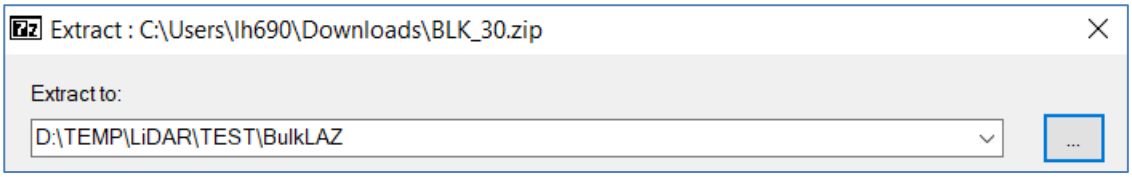


Note: Each bulk LAZ download block should be roughly 10GB (+/-) for the zipped download. These files (LAZ) have an impressive compression ratio, upwards of 90% at times. It's advised to prepare a storage location prior to beginning any file extraction or conversion process as the final output folder can exceed 80GB.

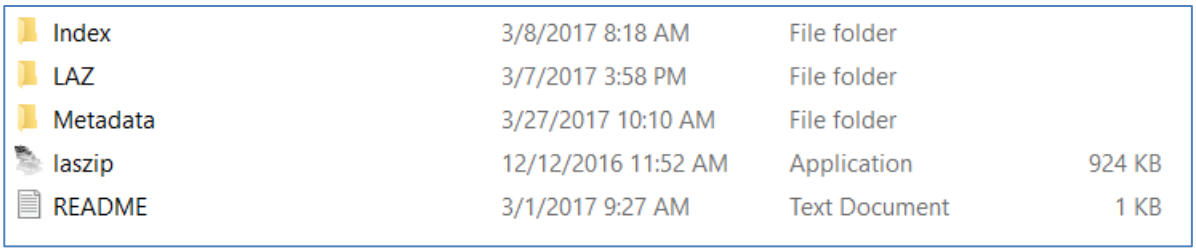
16. Locate your download

17. Extract the zipped folder to your desired location; as noted earlier ensure there is sufficient storage for the next few steps.

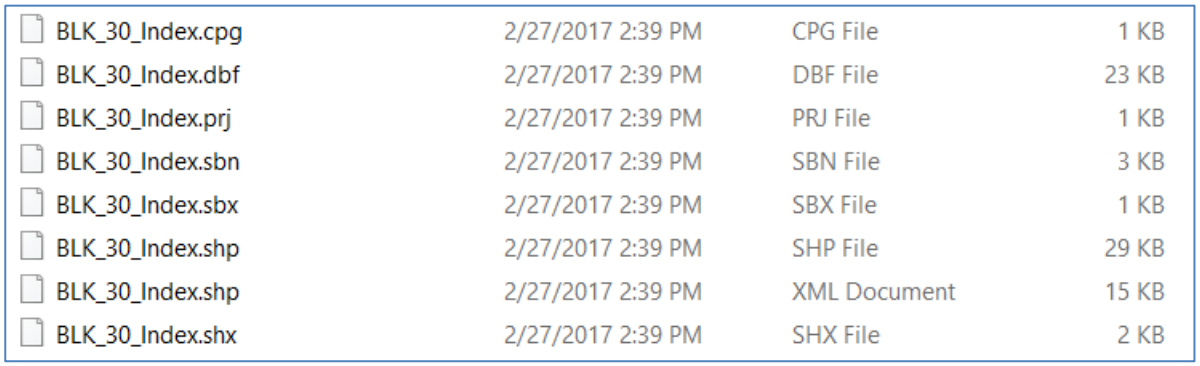
Example using 7Zip



18. Open the extracted folder and inspect it's contents:

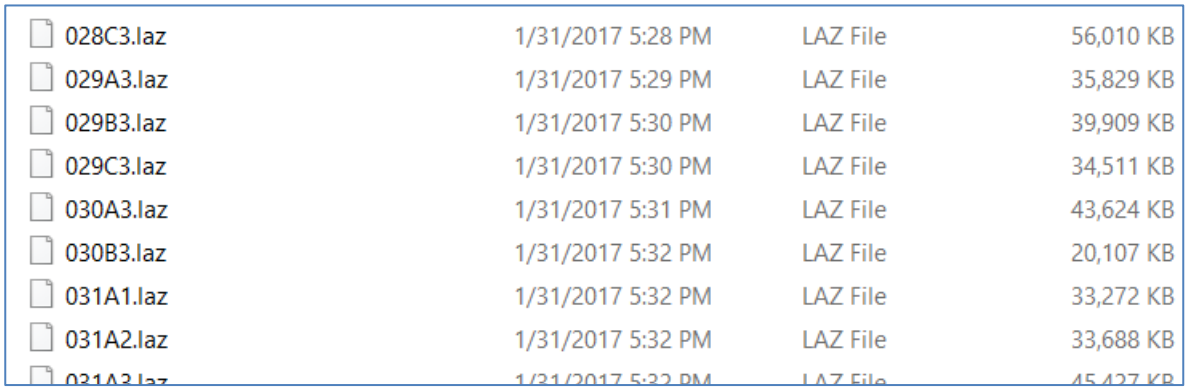


Index – Polygon features indicating LAS file location/layout



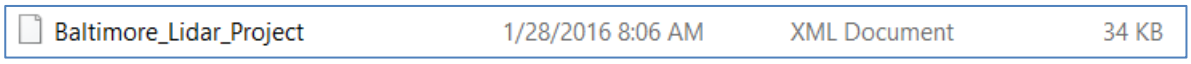
BLK_30_Index.cpg	2/27/2017 2:39 PM	CPG File	1 KB
BLK_30_Index.dbf	2/27/2017 2:39 PM	DBF File	23 KB
BLK_30_Index.prj	2/27/2017 2:39 PM	PRJ File	1 KB
BLK_30_Index.sbn	2/27/2017 2:39 PM	SBN File	3 KB
BLK_30_Index.sbx	2/27/2017 2:39 PM	SBX File	1 KB
BLK_30_Index.shp	2/27/2017 2:39 PM	SHP File	29 KB
BLK_30_Index.shp	2/27/2017 2:39 PM	XML Document	15 KB
BLK_30_Index.shx	2/27/2017 2:39 PM	SHX File	2 KB

LAZ – Folder of LAZ files



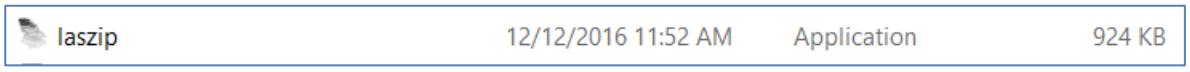
028C3.laz	1/31/2017 5:28 PM	LAZ File	56,010 KB
029A3.laz	1/31/2017 5:29 PM	LAZ File	35,829 KB
029B3.laz	1/31/2017 5:30 PM	LAZ File	39,909 KB
029C3.laz	1/31/2017 5:30 PM	LAZ File	34,511 KB
030A3.laz	1/31/2017 5:31 PM	LAZ File	43,624 KB
030B3.laz	1/31/2017 5:32 PM	LAZ File	20,107 KB
031A1.laz	1/31/2017 5:32 PM	LAZ File	33,272 KB
031A2.laz	1/31/2017 5:32 PM	LAZ File	33,688 KB

Metadata – Vendor-supplied metadata xml



Baltimore_Lidar_Project	1/28/2016 8:06 AM	XML Document	34 KB

Laszip – Application to convert LAZ to LAS



laszip	12/12/2016 11:52 AM	Application	924 KB

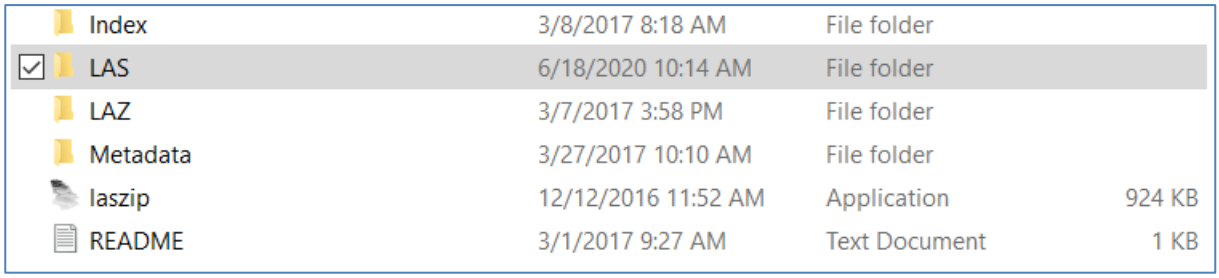
README – Text file with instructions on LAZ > LAS extraction

README	3/1/2017 9:27 AM	Text Document	1 KB

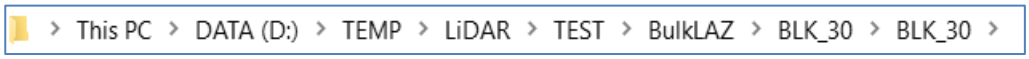
Convert LAZ to LAS

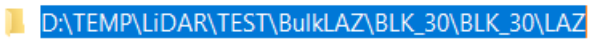
19. The most efficient way of converting LAZ files to LAS format is through a command prompt execution using the provided laszip executable.

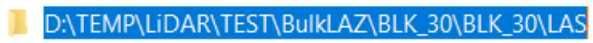
    Create a new file folder ‘LAS’ in a preferred location – ensure you have sufficient storage (remember LAZ to LAS conversion can sometimes result in 9x the required storage)



20. Make note of your folder locations





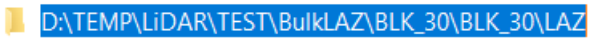


21. Open Command Prompt (Windows) and change letter drive if necessary

    In this example, the drive was changed from ‘C:’ to ‘D:’

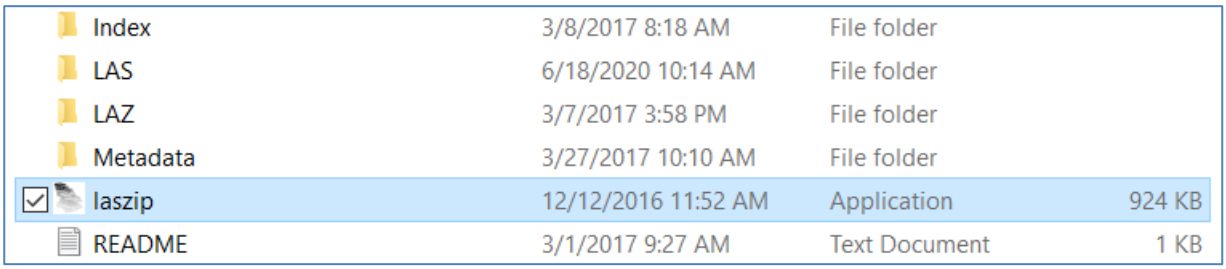
```
C:\Users\lh690>D:
```

22. Change directory into your LAZ folder. Enter ‘cd’ followed by a space, then copy and paste the directory path for your LAZ folder. Hit enter to continue




```
D:\>cd D:\TEMP\LiDAR\TEST\BulkLAZ\BLK_30\BLK_30\LAZ
```

23. Navigate back to the extracted download folder to locate the laszip executable file



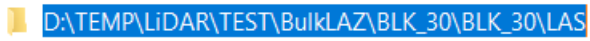
24. **Syntax: [laszip executable file path] *.LAZ -odir [desired output LAS folder path]**

    Drag and drop the laszip file into the command prompt window to copy and paste it's path

    hit space - do not hit enter

25. Continue with the following line, followed by a space: ***.LAZ -odir***

    Finish the prompt by copying and pasting the output LAS folder path into the command:

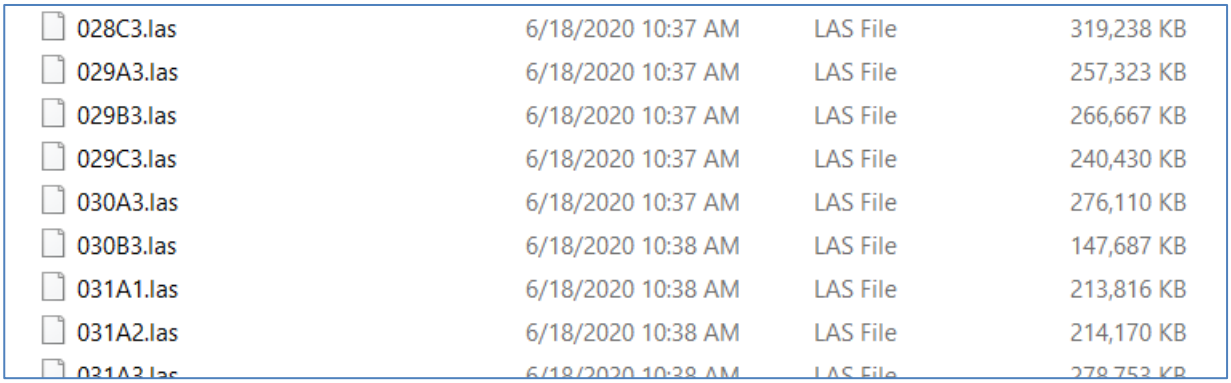
    

    Full code block (single line)

```
D:\TEMP\LiDAR\TEST\BulkLAZ\BLK_30\BLK_30\LAZ>D:\TEMP\LiDAR\TEST\BulkLAZ\BLK_30\BLK_30\laszip.exe
 *.laz -odir D:\TEMP\LiDAR\TEST\BulkLAZ\BLK_30\BLK_30\LAS
```

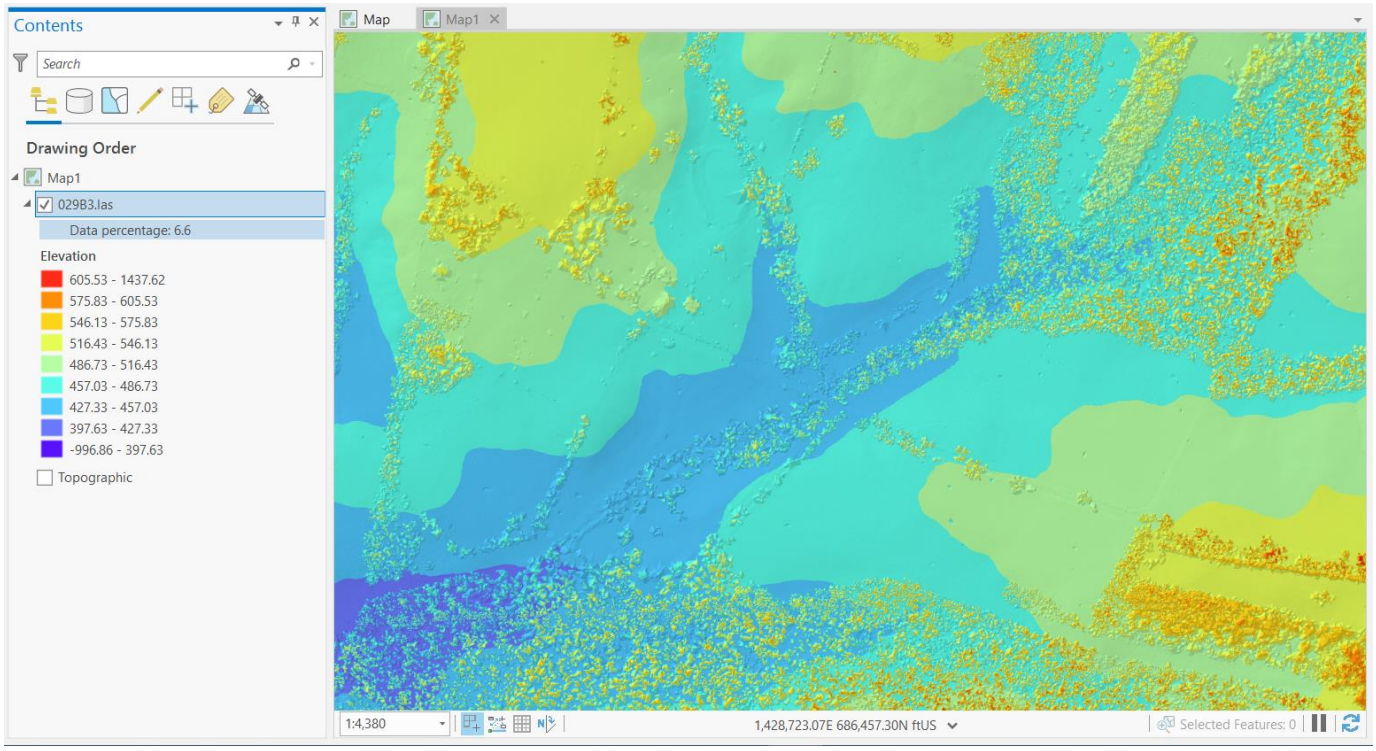
26. Hit enter to execute the command

    Navigate to your LAS folder to confirm that files are being converted/saved



27. Add data/LAS files to supporting GIS for inspection:

Example showing LAS file rendered as triangulated irregular network surface in ArcGIS Pro



Collection Metadata

28. Open web browser and navigate to https://imap.maryland.gov/Pages/lidar-metadata.aspx

29. Location your desired collection

Baltimore City	2015	MD / PA Sandy Supplemental LiDAR	0.7 m	0.7m	2.3ft	15.6 cm	N/A	USGS	Link
Baltimore	2015	Baltimore County LiDAR	0.7 m	0.7m	2.3ft	6.79 cm	27 cm	Baltimore County	Link
Calvert	2011	Calvert County LiDAR	1.4 m	2m	6.6ft	18.5 cm	N/A	Calvert County	Link

30. Click on the 'Link' to access the full metadata XML:

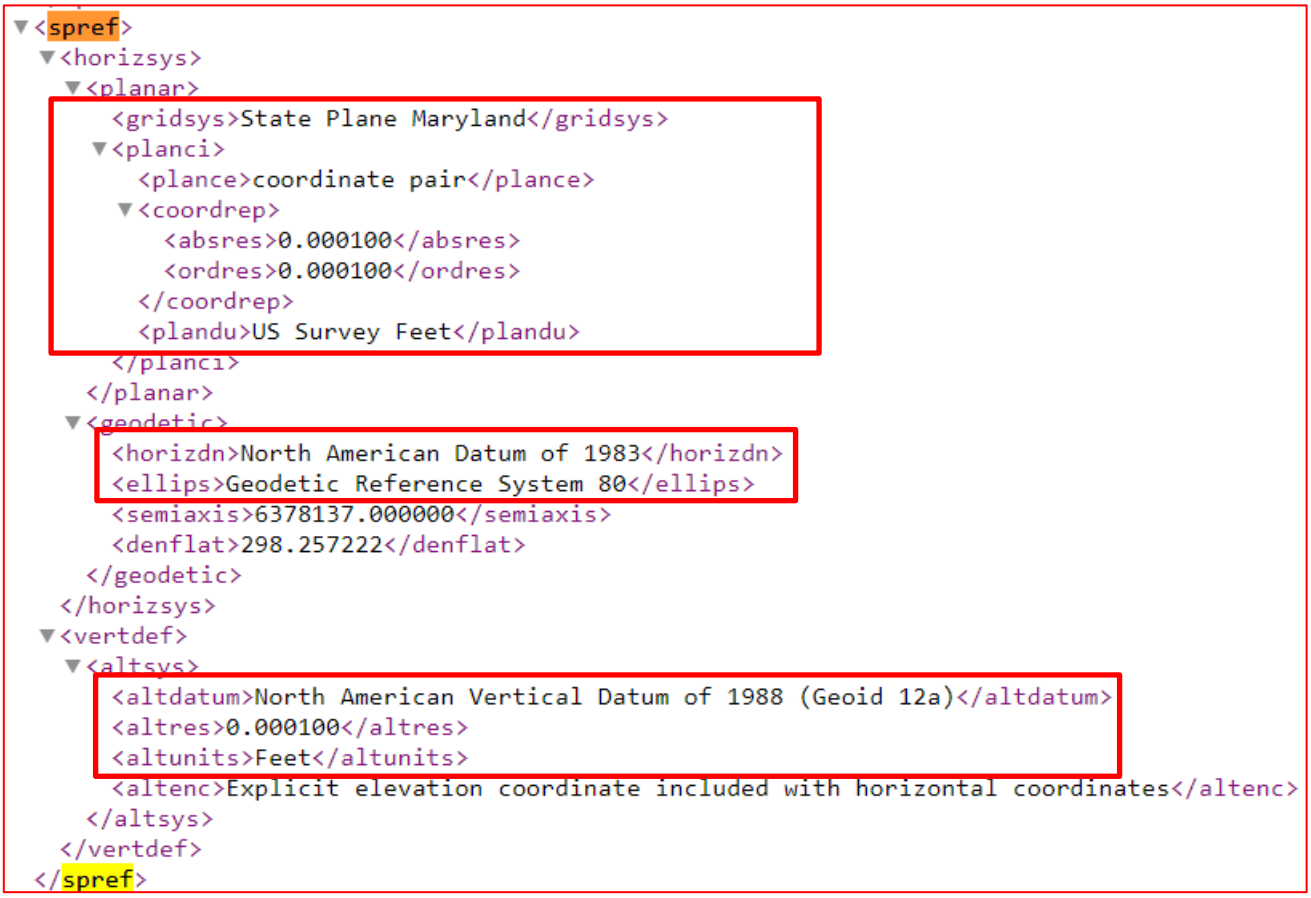
Baltimore	2015	Baltimore County LiDAR	0.7 m	0.7m	2.3ft	6.79 cm	27 cm	Baltimore County	Link

31. Click on the .xml link to open the XML document tree

NOTE: Metadata between two collections may vary; vendors do not all follow a similar formatting, nor do they all include the same information about their collection of data.

32. Use keywords to help identify important information about your LiDAR collection:
On click [Ctrl] + [F] to keyword search on the XML document tree in your browser

spref – Return spatial referencing system and horizontal resolution.



Other keywords you may find helpful!

<mdContact> - Vendor contact information

<NPS> - Nominal Point Spacing

<RMSE> - Root Mean Square Error

<lasinfo> - Details on LAS version, class codes, class item/descriptions

ADDITIONAL RESOURCES

For more information about Maryland LiDAR, please visit the Maryland LiDAR Overview page

For more information about additional training opportunities, please visit the MD iMAP Training Overview page, or contact Lisa Lowe, Senior GIS Analyst with the Maryland Department of Information Technology, Geographic Information Office at lisa.lowe@maryland.gov.

For additional MD iMAP datasets, please visit the GIS Data Catalog

For all other inquiries related to Maryland LiDAR, please contact the GIO Office at service.desk@maryland.gov.